

WHAT IS CLAIMED IS:

- 1 1. A method for measuring a position of a micro machined optical element, comprising:  
2 a) disposing at least one magnetic sensor on the micro machined optical element;  
3 b) exposing the at least one magnetic sensor to a magnetic field; and  
4 c) measuring a change in a property of the at least one magnetic sensor as the  
5 position of the micro machined optical element changes.
- 1 2. The method of claim 1 wherein the magnetic sensor senses a magnetic field  
2 that is used to actuate the micro machined optical element.
- 1 3. The method of claim 1 wherein the micro machined optical element includes a  
2 moveable portion and the at least one magnetic sensor is disposed on the  
3 moveable portion.
- 1 4. The method of claim 3 wherein the at least one magnetic sensor is selected  
2 from the group consisting of , magneto resistive sensors, giant  
3 magnetoresistance sensors, colossal magnetoresistance sensors, anisotropic  
4 magnetoresistance sensors, magnetic tunnel junction devices, Hall effect  
5 sensors, flux sensing coils, magnetostriction sensors and magneto optic  
6 sensors.
- 1 5. The method of claim 3 wherein the micro machined optical element includes a  
2 fixed portion and at least one sensor further includes one or more magnetic  
3 sensors disposed on the fixed portion.
- 1 6. The method of claim 5 wherein the magnetic sensor disposed on the fixed  
2 portion is disposed on a sidewall of the fixed portion.
- 1 7. The method of claim 5 wherein the fixed portion includes a base and the  
2 magnetic sensor that is disposed on the fixed portion is disposed on the base.
- 1 8. The method of claim 5 wherein the fixed portion includes a top chip and the  
2 sensor is disposed on the top chip.

- 1 9. The method of claim 5 wherein the sensor that is disposed on the movable  
2 portion and the sensor that is disposed on the fixed portion are electrically  
3 coupled in a bridge circuit
- 1 10. The method of claim 9 wherein the bridge circuit is a Wheatstone bridge  
2 circuit.
- 1 11. The method of claim 1 wherein the magnetic sensor senses a sense magnetic  
2 field that is separate from a magnetic field that actuates the micro machined  
3 optical element.
- 1 12. The method of claim 11, wherein a magnetic structure disposed on the micro  
2 machined optical element creates or changes the magnitude or direction of the  
3 sense magnetic field.
- 1 13. The method of claim 12, wherein the at least one magnetic sensor is selected  
2 from the group consisting of, magneto resistive sensors, giant  
3 magnetoresistance sensors, colossal magnetoresistance sensors, anisotropic  
4 magnetoresistance sensors, magnetic tunnel junction devices, Hall effect  
5 sensors, flux sensing coils, magnetostriction sensors and magneto optic  
6 sensors.
- 1 14. The method of claim 12 wherein the at least one magnetic sensor includes a  
2 magnetoresistive sensor characterized by a serpentine shape.
- 1 15. The method of claim 12 wherein the at least one magnetic sensor includes two  
2 or more magnetic sensors.
- 1 16. The method of claim 15 wherein the two or more sensors are coupled together  
2 in a bridge circuit.
- 1 17. The method of claim 16 wherein the bridge circuit is a Wheatstone bridge  
2 circuit.
- 1 18. The method of claim 11 wherein the micro machined optical element includes  
2 a moveable portion wherein the moveable portion is moveable with respect to  
3 an axis.

- 1 19. The method of claim 18 wherein the magnetic material is disposed  
2 substantially parallel to the axis.
- 1 20. The method of claim 19 wherein the at least one sensor includes a  
2 magnetoresistive sensor;  
3 wherein the magnetoresistive sensor has a "C" shape having a gap;  
4 wherein, in at least one position of the moveable element, the magnetic  
5 material is disposed within the gap.
- 1 21. The method of claim 18 wherein the magnetic material is disposed  
2 substantially perpendicular to the axis.
- 1 22. The method of claim 21 wherein the at least one sensor includes a  
2 magnetoresistive sensor;  
3 wherein the magnetoresistive sensor has a "C" shape having a gap;  
4 wherein, in at least one position of the moveable element, the magnetic  
5 material is disposed within the gap.
- 1 23. The method of claim 1, further comprising:  
2 measuring a temperature; and  
3 compensating for a change in the property of the at least one magnetic sensor  
4 with temperature.
- 1 24. The method of claim 23, wherein the compensating step includes determining  
2 a relationship between the property of the magnetic sensor and the measured  
3 temperature.
- 1 25. The method of claim 23, wherein the compensating step includes regulating  
2 the temperature to maintain the temperature within a desired range.
- 1 26. A method for measuring the position of a micro machined optical element, the micro  
2 machined optical element having at least one magnetic sensor, the method  
3 comprising:  
4 a) exposing the at least one magnetic sensor to a magnetic field; and  
5 b) measuring a change in a property of the at least one magnetic sensor as a  
6 position of the micro machined optical element changes.

- 1 27. The method of claim 26, further comprising:  
2 measuring a temperature; and  
3 compensating for a change in the property of the at least one magnetic sensor  
4 with temperature.
- 1 28. The method of claim 27, wherein the compensating step includes determining  
2 a relationship between the property of the magnetic sensor and the measured  
3 temperature.
- 1 29. The method of claim 27, wherein the compensating step includes regulating  
2 the temperature to maintain the temperature within a desired range.